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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5)  <b>10/031679</b>	
INTERNATIONAL APPLICATION NO. PCT/DE00/02368		INTERNATIONAL FILING DATE (19.07.00) 19 July 2000		PRIORITY DATE(S) CLAIMED (21.07.99) 21 July 1999	
TITLE OF INVENTION <b>SUBSTRATE AND WORKPIECE CARRIER FOR HOLDING THE SUBSTRATE</b>					
APPLICANT(S) FOR DO/EO/US  <b>WEIBLEN, Kurt; GOEBEL, Herbert; WANKA, Harald; KRETSCHMANN, André; HENN, Ralf; WINGSCH, Volker; GLUECK, Joachim, and SCHARPING, Armin</b>					
Applicant(s) herewith submit to the United States Designated/Elected Office (DO/EO/US) the following items and other information					
1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371 3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) immediately rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)) 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired d. <input checked="" type="checkbox"/> have not been made and will not be made 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)) (unsigned). 10. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).  <b>Items 11. to 16. below concern other document(s) or information included:</b> 11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment. <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment 14. <input checked="" type="checkbox"/> A substitute specification and a marked-up version of the substitute specification. 15. <input type="checkbox"/> A change of power of attorney and/or address letter 16. <input checked="" type="checkbox"/> Other items or information: International Search Report (translated), International Preliminary Examination Report (translated) and Form PCT/RO/101.					

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U.S. APPLICATION NO. If known, see  
37 C.F.R. 1.5 1070

If known, see 10/031679

INTERNATIONAL APPLICATION NO.

PCT/DE00/02368

ATTORNEY'S DOCKET NUMBER

10191/2222

17. ☒ The following fees are submitted.

**Basic National Fee (37 CFR 1.492(a)(1)-(5)):**

Search Report has been prepared by the EPO or JPO . . . . . \$890 00

International preliminary examination fee paid to USPTO (37 CFR 1.482) . . . \$710 00

No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))	\$740.00
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Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO . . . . . \$1,040 00

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all  
claims satisfied provisions of PCT Article 33(2)-(4) . . . . . \$100 00

ENTER APPROPRIATE BASIC FEE AMOUNT =

**\$ 890**

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months  
from the earliest claimed priority date (37 CFR 1.492(e))

\$

Claims	Number Filed	Number Extra	Rate		
Total Claims	22 - 20 =	2	X \$18.00	\$ 36 00	
Independent Claims	2 - 3 =	0	X \$84 00	\$0	
Multiple dependent claim(s) (if applicable)			+ \$280.00	\$ 0	

TOTAL OF ABOVE CALCULATIONS =

\$ 926

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28)

CA

SUBTOTAL =

\$ 926

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).

2

TOTAL NATIONAL FEE =

\$ 926

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) \$40.00 per property +

1.

TOTAL FEES ENCLOSED =

\$ 926

Amount to be:  
refunded

\$

charged

§

- a. ☐ A check in the amount of \$ \_\_\_\_\_ to cover the above fees is enclosed.
- b. ☒ Please charge my Deposit Account No. 11-0600 in the amount of \$926.00 to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No 11-0600. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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Richard L. Mayer, Reg No 22,490

NAME \_\_\_\_\_

DATE \_\_\_\_\_

10034679-051702  
10/031679  
531 Rec'd PCT/PC 22 JAN 2002

[10191/2222]

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant(s) : Kurt WEIBLEN et al.  
Serial No. : To Be Assigned  
Filed : Herewith  
For : SUBSTRATE AND WORKPIECE CARRIER FOR HOLDING  
THE SUBSTRATE  
Art Unit : To Be Assigned  
Examiner : To Be Assigned

Assistant Commissioner  
for Patents  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT AND  
37 C.F.R. § 1.125 SUBSTITUTE SPECIFICATION STATEMENT**

SIR:

Please amend without prejudice the above-identified application before examination, as set forth below.

**IN THE SPECIFICATION AND ABSTRACT:**

In accordance with 37 C.F.R. § 1.121(b)(3), a Substitute Specification (including the Abstract, but without claims) accompanies this response. It is respectfully requested that the Substitute Specification (including Abstract) be entered to replace the Specification of record.

**IN THE CLAIMS:**

On the first page of claims, first line, change "What is claimed is" to  
--WHAT IS CLAIMED IS--,

Please cancel without prejudice claims 1 to 21 in the underlying PCT application.

Please also cancel, without prejudice, claims 1 and 20 in the annex to the International Preliminary Examination Report.

Please add the following new claims:

- 22. (New) A workpiece carrier for holding a plurality of pre-diced and essentially rotationally symmetric substrates during processing of a substrate surface, comprising:
- a holder configured to hold the plurality of substrates while they are positioned;
  - a handling element; and
  - a base element configured to hold one of the substrates and positioned on the handling element, process-dependent covering elements being assignable to a side of the base element opposite the handling element, the positioning of the substrate fixed by a holding of a rotational position of the substrate.
23. (New) The workpiece carrier according to claim 22, wherein the base element includes individual carrier elements, and wherein the substrate includes a contact surface against which the carrier elements rest.
24. (New) The workpiece carrier according to claim 23, wherein the contact surface of includes a lower edge of a collar provided around a circumference of the substrate.
25. (New) The workpiece carrier according to claim 24, wherein the carrier elements extend into a location hole in the base element.
26. (New) The workpiece carrier according to claim 25, wherein the substrate is positioned on the carrier elements of the base element so that at least one opening extends between one edge of the location hole in the base element and a side wall of the substrate.
27. (New) The workpiece carrier according to claim 26, wherein the location hole in the base element includes a hexagonal structure.
28. (New) The workpiece carrier according to claim 22, wherein the base element and the substrate each include at least one complementary positioning element configured to fix the substrate in a relative spatial position.

29. (New) The workpiece carrier according to claim 28, wherein the plurality substrate includes a groove provided in a side wall of the substrate, and the base element includes a complementary lug.

30. (New) The workpiece carrier according to claim 29, wherein the groove is arranged against a lower edge of a collar provided around a circumference of the substrate, and the complementary lug extends into a location hole in the base element.

31. (New) The workpiece carrier according to claim 22, further comprising an arrangement configured to position the handling element and the covering elements relative to one another.

32. (New) The workpiece carrier according to claim 31, wherein the arrangement includes one of guide pins, turn-lock fasteners, expansion pins and mechanical stops.

33. (New) The workpiece carrier according to claim 22, wherein a coding arrangement is assigned to at least one of the handling element and the covering elements.

34. (New) The workpiece carrier according to claim 33, wherein the coding arrangement includes one of notches, bar codes and holes on a surface of the handling element.

35. (New) The workpiece carrier according to claim 22, wherein the covering element includes individual supporting elements, and the substrate includes a supporting surface against which the supporting elements rest.

36. (New) The workpiece carrier according to claim 35, wherein the supporting surface includes an upper edge of a collar provided around a circumference of the substrate.

37. (New) The workpiece carrier according to claim 22, wherein the covering element includes process areas configured to allow selective treatment of a substrate surface.

38. (New) The workpiece carrier according to claim 37, wherein the process areas of the covering element are configured to be positioned on the substrate during treatment with liquid media so that they are located above openings between the base elements and the substrates.

39. (New) The workpiece carrier according to claim 38, wherein the process areas of the covering element includes a hexagonal structure.

40. (New) The workpiece carrier according to claim 37, wherein the process areas of the covering element area configured to be positioned on the substrate during treatment of the substrate surface by one of precipitation, plasma etching, photolithography and passivation so that the covering element forms a seal with a circumferential edge of the substrate surface.

41. (New) The workpiece carrier according to claim 22, wherein the substrate includes a thin-film substrate.

42. (New) A substrate, comprising:

a substrate surface, the substrate essentially rotationally symmetric and configured to be positioned during a processing of the substrate surface in a holder of a workpiece carrier, the substrate and the workpiece carrier each including at least one complementary positioning element configured to fix a relative spatial position of the substrate, a positioning configured to be fixed by a holding of a rotational position of the substrate.

43. (New) The substrate according to claim 42, wherein the substrate includes one of a groove and a notch.

44. (New) The substrate according to claim 42, wherein the substrate includes a thin-film substrate.--.

#### **REMARKS**

This Preliminary Amendment cancels without prejudice claims 1 to 21 in the underlying PCT Application No. PCT/DE00/02368. This Preliminary Amendment also cancels, without prejudice, claims 1 and 20 in the annex to the International Preliminary Search Report

and adds new claims 22 to 44. The new claims conform the claims to U.S. Patent and Trademark Office rules and do not add new matter to the application.

In accordance with 37 C.F.R. § 1.121(b)(3), the Substitute Specification (including the Abstract, but without the claims) contains no new matter. The amendments reflected in the Substitute Specification (including Abstract) are to conform the Specification and Abstract to U.S. Patent and Trademark Office rules or to correct informalities. As required by 37 C.F.R. § 1.121(b)(3)(iii) and § 1.125(b)(2), a Marked-Up Version of the Substitute Specification comparing the Specification of record and the Substitute Specification also accompanies this Preliminary Amendment. Approval and entry of the Substitute Specification (including Abstract) is respectfully requested.

The underlying PCT Application No. PCT/DE00/02368 includes an International Search Report, dated January 10, 2001. The Search Report includes a list of documents that were uncovered in the underlying PCT Application. A copy of the Search Report accompanies this Preliminary Amendment.

The underlying PCT Application No. PCT/DE00/02368 also includes an International Preliminary Examination Report, dated October 22, 2001. An English translation of the International Preliminary Examination Report and the annex thereto accompanies this Preliminary Amendment.

Applicants assert that the subject matter of the present application is new, non-obvious, and useful. Prompt consideration and allowance of the application are respectfully requested.

Respectfully Submitted,

KENYON & KENYON

Dated: January 22, 2002

By: Richard L. Mayer (Reg. No. 42,194)  
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[10191/2222]

# SUBSTRATE AND WORKPIECE CARRIER FOR HOLDING THE SUBSTRATE

The present invention relates to a workpiece carrier for holding a substrate, in particular a thin film substrate, having the features according to the definition of species of Claim 1, and a substrate having the features according to the definition of species of Claim 20.

## Background Information

Stainless steel substrates with molded membranes, to which various functional layers are applied with thin film technology, are normally used to produce sensor elements, in particular high-pressure sensor elements. These functional layers include, for example, insulating layers, sensitive resistance layers, electrically conductive layers from which conductors or contacts may be structured, as well as passivation layers.

In mass-producing a single-substrate sensor element, it is economical to process the elements in groups. For this purpose, concepts have already been developed which are intended to meet the different requirements of the specific individual thin film production processes. Thus, the substrate is usually held on a workpiece carrier which is used, among other things, to position the substrate during the individual process steps.

A known method is to place the substrate in a very massive workpiece carrier at the beginning of the thin film production and leave it in this massive workpiece carrier throughout the thin film production process. The disadvantage of this approach is that the workpiece carrier is extremely heavy and has a considerable installation height, making it difficult to carry out individual process steps. In addition, a design of



this type requires complicated screw connections. Furthermore, media entrainment may occur, particularly during treatment with liquid media, which makes mass production difficult.

5 Another known method is to use a separate workpiece carrier which is adapted to the type of processing for each individual thin-film production process step. Between the individual process steps, the substrates must be placed in the special workpiece carrier and then removed again at the end of the  
10 process step. The disadvantage of this is that it requires considerable assembly and handling effort and, due to the large number of possible process steps, errors may occur when positioning the substrate, so that considerable waste poses another obstacle to mass production.

15

#### Summary of the Invention

According to the present invention, this object is achieved by using a substrate and a workpiece carrier for holding the  
20 substrate, in particular a thin film substrate, having the features described in Claims 1 and 10. Because the workpiece carrier has a base element for holding the substrate, the base element is arranged on a handling element, and the base element may be assigned process-dependent cover elements on a  
25 side opposite the handling element, it is possible to economically mass-produce the sensor elements. A characterizing feature of the substrate is that the substrate and the workpiece carrier each have at least one complementary positioning element which is used to fix the substrate in a  
30 relative spatial position (positioning unit). The positioning unit makes it possible to prevent axial displacement or radial twisting of the substrate in the base element during thin film production, thus reducing production-related waste, in particular when automating the thin film production process.  
35 For this purpose, the substrate has, for example, a groove or notch provided in the side wall of the substrate, and the base

element has a complementary lug which engages with this groove when the substrate is inserted into the base element.

5 According to a preferred embodiment of the present invention, the base element has individual carrier elements on which a contact surface of the substrate is supported. For example, this contact surface may be formed by a lower edge of a collar provided around the circumference of the substrate. The carrier elements may extend into a location hole in the base  
10 element. This makes it possible to position the substrate on the carrier elements of the base element so that at least one opening extends between one edge of the location hole in the base element and a side wall of the substrate. This provides sufficient transparency for liquid media which are used in  
15 certain process steps, making it possible to effectively prevent media entrainment.

It has also proven to be advantageous to provide the handling element and cover elements with means for relative positioning  
20 one to each other. For example, these means may be guide pins, turn-lock fasteners, expansion pins or mechanical stops. This makes it possible to precisely position the cover element on the handling element.

25 In addition, the handling element and/or the cover elements may be provided with coding means by providing, for example, notches, bar codes or holes on the surfaces of the handling elements. On the whole, this makes it possible to automate the thin film production process with greater process reliability  
30 so that it is suitable for mass production.

In a preferred embodiment of the present invention having individual supporting elements, the cover elements rest against a supporting surface of the substrate, for example an  
35 upper edge of the collar provided around the circumference of the substrate. The cover element has process areas that permit selective treatment of one surface of the substrate (mask).

During treatment with liquid media, in particular, the cover element is positioned on the substrate so that the process areas lie above the openings between the base elements and the substrates, thus ensuring a high degree of transparency for the liquid medium.

During treatment of the substrate surface of the substrate by deposition, plasma etching, photolithography, passivation or similar methods, it is advantageous for the cover element to form a seal with a circumferential edge of the substrate surface. Not only does this enable more accurate positioning, it also further suppresses media entrainment.

Additional preferred embodiments of the present invention are derived from the remaining features described in the subordinate claims.

#### Brief Description of the Drawing

The present invention is explained in greater detail below on the basis of exemplary embodiments illustrated in the drawing, where

Figure 1 shows a sectional view of a sensor element with various functional layers on a substrate;

Figure 2 shows different views of a substrate for thin film production;

Figure 3 shows a top view of a base element for holding the substrate;

Figure 4 shows a top view of a handling element on which a number of base elements are provided;

Figure 5 shows a sectional view and a top view of a workpiece carrier and the substrate in the region of a base

element during treatment of a substrate surface with a liquid medium;

Figure 6 shows a sectional view and a top view of a workpiece carrier and the substrate in the region of a base element during treatment of a substrate surface by deposition, plasma etching or similar methods;

Figure 7 shows a sectional view of a workpiece carrier and the substrate during passivation of the substrate surface and precipitation of a contacting layer using shadow masking technology;

Figure 8 shows a perspective side view of a work bench for holding the workpiece carrier; and

Figure 9 shows a perspective side view of a work bench arrangement for holding the workpiece carrier during automated thin film production.

#### Detailed Description of the Exemplary Embodiments

Figure 1 shows a sectional view of a sensor element 10 on which different functional layers are applied to a substrate 12, based on the known thin film technology. Functional layers of this type include sensitive layers 14, a contacting layer 16, a passivation layer 18 and an insulating layer 20, which are provided on a substrate surface 22. It is also possible to incorporate additional form features into substrate 12 without limiting the functionality of sensor element 10. For example, a collar 24 which supports the thin film production process may be provided around the circumference of substrate 12.

Figure 2 also shows substrate 12 in a variety of detailed views. The radial structure of substrate 12 is interrupted in the area of a groove 26, which is milled into a side wall 27.

Groove 26 acts as a positioning element 29, which is explained in greater detail below.

Throughout the production process of sensor element 10,  
5 individual substrates 12 are provided in a base element 28,  
which, in turn, is part of a handling element 30. Figure 4  
shows a top view of a handling element 30 of this type, and  
Figure 3 shows a top view of an individual base element 28 of  
handling element 30.

10 According to Figure 3, substrate 12 is positioned with a  
contact surface 32 on individual carrier elements 34 of base  
element 28. Base element 28 forms a location hole 36 into  
which carrier elements 34 extend. According to the exemplary  
15 embodiment, contact surface 32 is formed by a lower edge 38 of  
collar 24. As shown in the top view illustrated in Figure 3,  
multiple openings 40 extend between an edge 42 of base element  
28 and substrate 12. If necessary, liquid media which are used  
in a process step during thin film production for treating or  
20 cleaning sensor surface 22 may flow off through openings 40.

Base element 28 also has a rectangular lug 44 as a  
complementary positioning element 31, which also extends into  
location hole 36. During thin film production, substrate 12 is  
25 inserted into location hole 36 in base element 28 so that lug  
44 engages with groove 26. In this manner, substrate 12 is  
fixed in a relative position, and both positioning elements  
29, 31 serve as a positioning unit. The positioning unit may,  
of course, be adapted in a variety of ways to the given  
30 geometric requirements of substrate 12.

A number of base elements 28 corresponding to the given  
dimensions may be arranged on handling element 30. The  
hexagonal basic structure of base elements 28 according to the  
35 exemplary embodiment makes it possible to arrange the elements  
particularly close together. Handling element 30 also has  
openings 46, 48, which serve to position handling element 30

and a cover element 50, which is described in greater detail below, during the individual process steps and/or to position a workpiece carrier (handling element 30 and cover element 50) on a work bench 80 in a manner that is explained in greater detail below. Opening 46 may hold, for example, a turn-lock fastener, while opening 48 may be used to hold guide pins, expansion pins or similar devices.

Furthermore, handling element 30 and/or cover elements 50 may be provided with coding means to enable automation of the thin film production process. For example, holes 52 on a surface 54 of handling element 30 may provide information about the progress of the process or similar details. Notches 56 may be used to detect a relative position of handling element 30 using suitable sensors.

Throughout the thin film production process, substrate 12 is fixed to base element 28, as explained above. In each subsequent process step, a process-dependent cover element 50 is placed on substrate 12. For this purpose, substrate 12 has a supporting surface 58, for example on an upper edge 60 of collar 24, and cover element 50 has corresponding supporting elements 62 (Figures 2 and 5).

Figure 5 shows a cover element 50 like those customarily used in the treatment of substrate surface 22 with a liquid medium. Substrate 12 is wetted with the liquid medium in a process area 64 which is provided by a recess in the area of cover element 50. This makes it possible to selectively treat substrate surface 22 by suitably designing process area 64, for example, by covering partial areas of substrate surface 22 with cover element 50. According to the exemplary embodiment, process area 64 is selected so that it also extends over openings 40 between base element 28 and substrate 12.

Accordingly, the liquid medium may thus flow off or be flushed through openings 40 either during or after the process step and thus greatly reduce medium entrainment.

If the process steps involve treating substrate surface 22 by deposition, plasma etching, photolithography or a similar method, cover element 50 may be adapted accordingly (Figure 6). For this purpose, a sealing edge 68 of cover element 50 lies flush against a circumferential edge 66 of substrate 12 so that only substrate surface 22 is machined during the process step. Extremely accurate positioning of substrate 12 is achieved with the help of insertion slopes 69 along which substrate 12 slides while cover element 50 is being placed.

Figure 7 shows a sectional view of an arrangement of the individual workpiece carrier elements during the provision of conductors or during passivation of substrate surface 22. Cover element 50 includes a positioning plate 70, a pressure plate 72 and a shadow mask 74 provided between these two plates 70, 72. On a bottom of base element 28, a further pressure plate 76 and a spring plate 78 are used to apply a force to substrate 12, so that substrate surface 22 lies flat against shadow mask 74 during the process step.

According to the process steps during thin film production of a sensor element 10 illustrated by way of example in Figures 5 through 7, substrate 12 always remains in base element 28, and only cover elements 50 are exchanged. If necessary (Figure 7), additional elements supporting the process step, for example a pressure plate 76 and a spring plate 78, may be assigned to base element 28.

The workpiece carrier may be fixed in place throughout the production process. As explained above, means such as guide pins, turn-lock fasteners, expansion pins and mechanical stops are suitable for this purpose. The workpiece carrier may be fixed to work bench 80 during thin film production, as illustrated by the perspective side view in Figure 8. For this purpose, work bench 80 has guide pins 82, location holes 84 for positioning elements or spacers 86 on its surface 88. It

is also useful to integrate discharge openings 90 for fluid media into work bench 80.

Figure 9 shows a schematic diagram illustrating a possible method of automation of thin film production using a robot 92. According to a pending process step, a robot arm 94 takes a cover element 50 from a cassette 96 and places it on handling element 30, which is provided on work bench 80. On the basis of holes 52 and notches 56 in handling element 30 for example, it is possible to determine a relative position and a pending process step using suitable sensors. After completion of the process step, cover element 50 is replaced in cassette 96 and the next process step begins.



What is claimed is

1. A workpiece carrier for holding a substrate, in particular a thin film substrate, during substrate processing, comprising a holder that holds and positions the substrate, wherein the workpiece carrier includes a base element (28) for holding the substrate (12); the base element (28) is positioned on a handling element (30); and process-dependent cover elements (50) may be assigned to the base element (28) on a side opposite the handling element (30).

2. The workpiece carrier according to Claim 2, wherein the base element (28) includes individual carrier elements (34); and the substrate (12) has a contact surface (32) against which the carrier elements (34) rest.

3. The workpiece carrier according to Claim 3, wherein the contact surface (32) is formed by a lower edge (38) of a collar (24) provided around the circumference of the substrate (12).

4. The workpiece carrier according to Claim 2, wherein the carrier elements (34) extend into a location hole (36) in the base element (28).

5. The workpiece carrier according to Claim 4, wherein the substrate (12) is positioned on the carrier elements (34) of the base element (28) such that at least one opening (40) extends between one edge (42) of the location hole (36) in the base element (28) and a side wall (27) of the substrate (12).

6. The workpiece carrier according to Claim 5, wherein the location hole (36) in the base element (28) has a hexagonal structure.

7. The workpiece carrier according to one of the preceding claims,

wherein the base element (28) and the substrate (12) each have at least one complementary positioning element (29, 31) which is used to fix the substrate (12) in a relative spatial position (positioning unit).

8. The workpiece carrier according to Claim 7,  
wherein the substrate (12) has a groove (26) that is provided  
in the side wall (27) of the substrate (12); and the base  
element (28) has a complementary lug (44).

9. The workpiece carrier according to Claim 8,  
wherein the groove (26) lies against the lower edge (38) of  
the collar (24) provided around the circumference of the  
substrate (12); and the complementary lug (44) extends into  
the location hole (26) in the base element (28).

10. The workpiece carrier according to one of the preceding claims,  
wherein the handling element (30) and the cover elements (50) are provided with means for positioning relative to one another.

11. The workpiece carrier according to Claim 10,  
wherein the positioning means include guide pins, turn-lock  
fasteners, expansion pins or mechanical stops.

12. The workpiece carrier according to one of the preceding claims,  
wherein coding means are assigned to the handling element (30)  
and/or the cover elements (50).

13. The workpiece carrier according to Claim 12,  
wherein the coding means include notches, bar codes (56) or  
holes (52) on a surface (54) of the handling element (30).

14. The workpiece carrier according to one of the preceding claims,  
wherein the cover element (50) includes individual supporting elements (62); and the substrate (12) has a supporting surface (58) against which the supporting elements (62) rest.

15. The workpiece carrier according to Claim 14,  
wherein the supporting surface (58) is formed by an upper edge (60) of the collar (24) provided around the circumference of the substrate (12).

16. The workpiece carrier according to one of the preceding claims,  
wherein the cover element (50) includes process areas (64) that allow selective treatment of a substrate surface (22) (mask).

17. The workpiece carrier according to Claims 5 and 16,  
wherein the process areas (64) of the cover element (50) are positioned on the substrate (12) during treatment with liquid media so that they are located above the openings (40) between the base elements (28) and the substrates (12).

18. The workpiece carrier according to Claim 17,  
wherein the process areas (64) of the cover element (50) have a hexagonal structure.

19. The workpiece carrier according to Claim 16,  
wherein the process areas (64) of the cover element (50) are positioned on the substrate (12) during treatment of the substrate surface (22) by precipitation, plasma etching, photolithography, passivation or a similar method so that cover element (50) forms a seal with a circumferential edge (66) of the substrate surface (54).



# Abstract of the Disclosure

Substrate and workpiece carrier for holding the substrate, in particular a thin film substrate, during substrate processing, having a holder that holds and positions the substrate.

The workpiece carrier has a base element (28) for holding the substrate (12); the base element (28) is provided on a handling element (30); and process-dependent cover elements (50) may be assigned to the base element (28) on a side opposite the handling element (30). In addition, the substrate (12) and the workpiece carrier each have at least one complementary positioning element (29, 31) which is used to secure the substrate (12) in a relative spatial position (positioning unit).

(Figure 1)

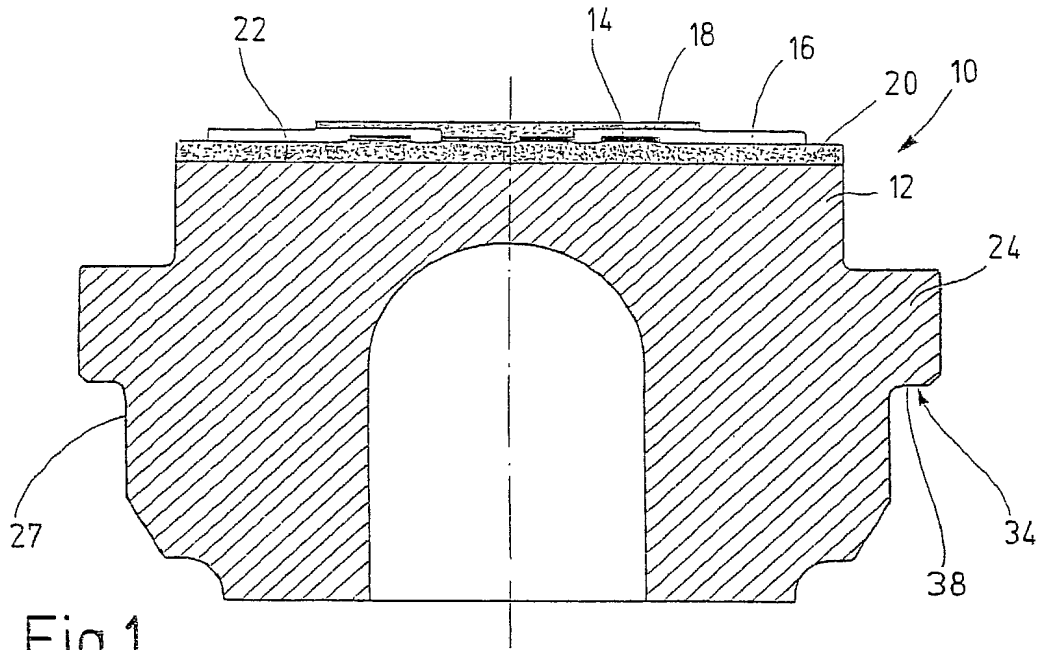


Fig.1

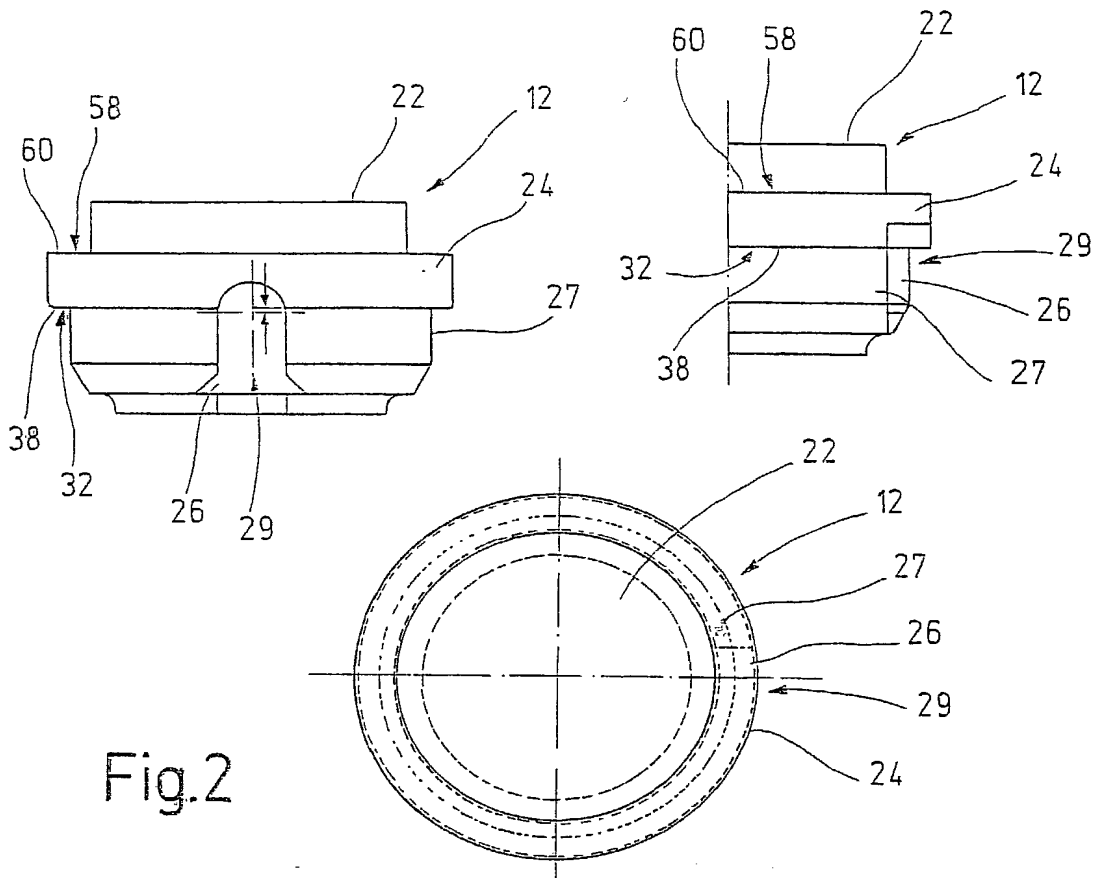


Fig.2

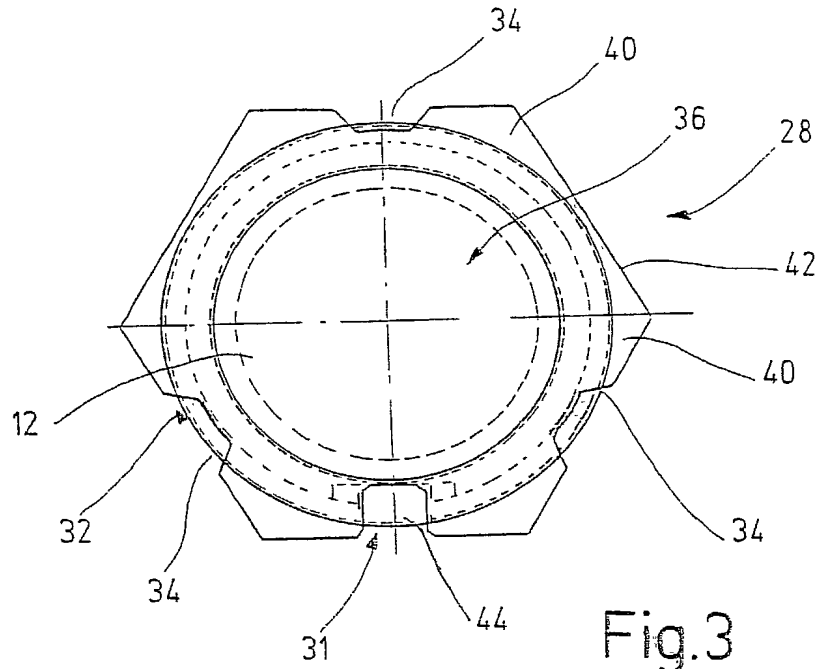
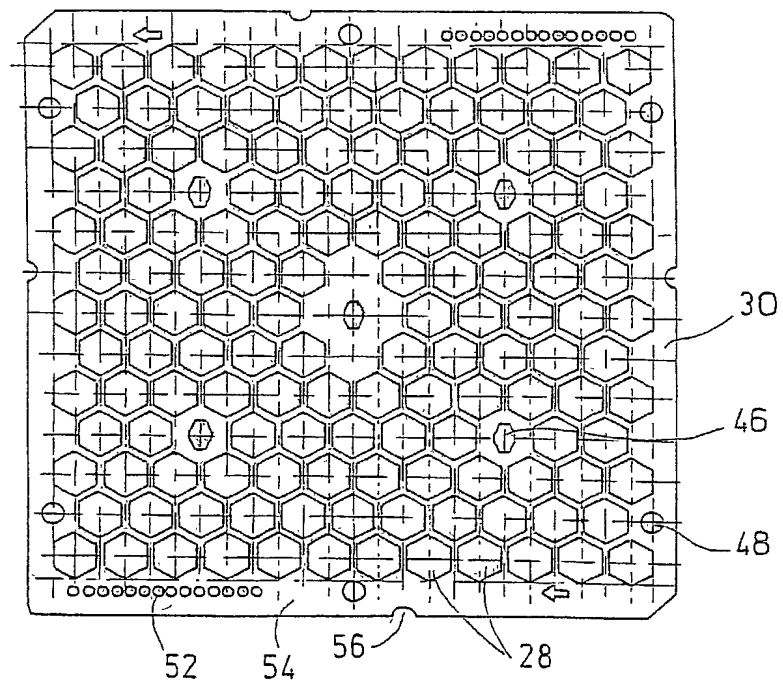
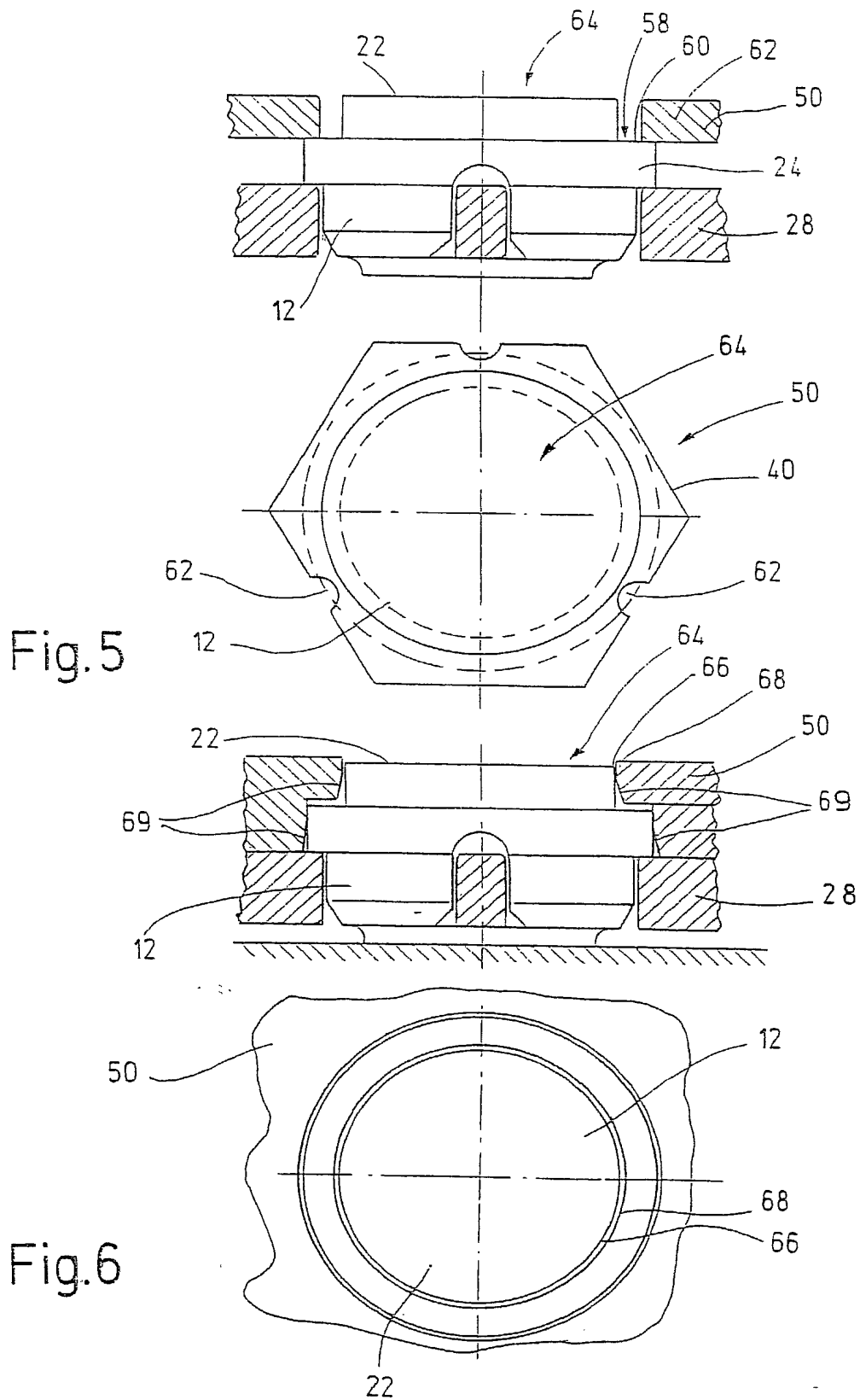


Fig. 4







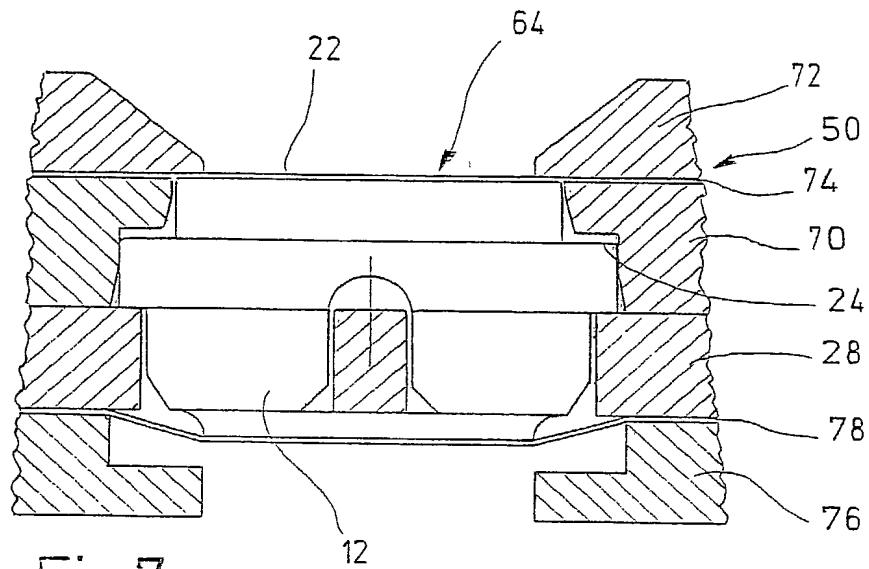


Fig.7

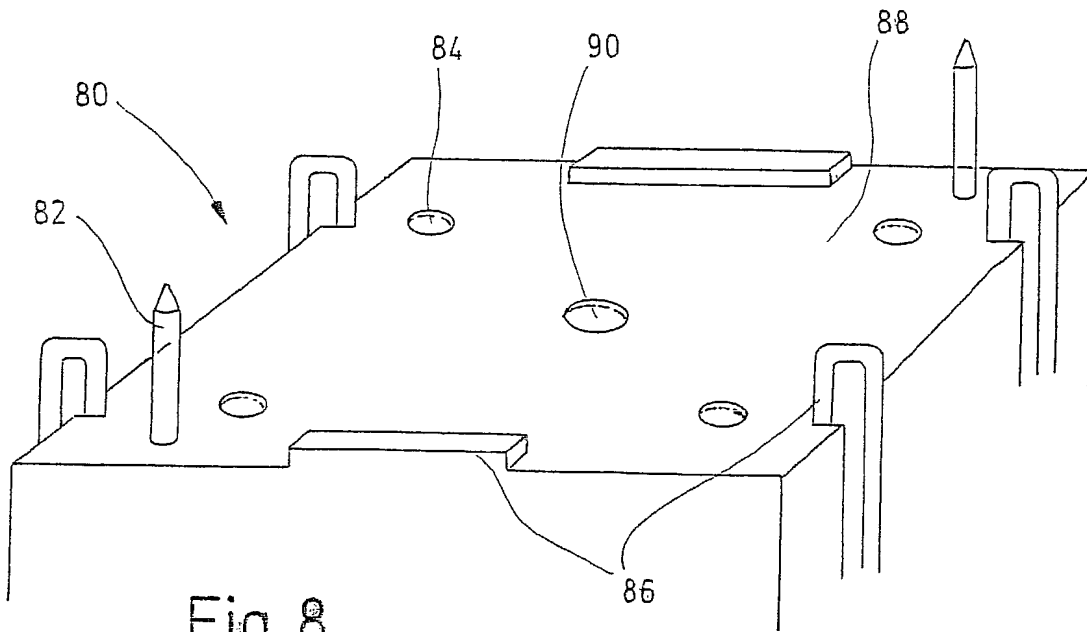


Fig. 8

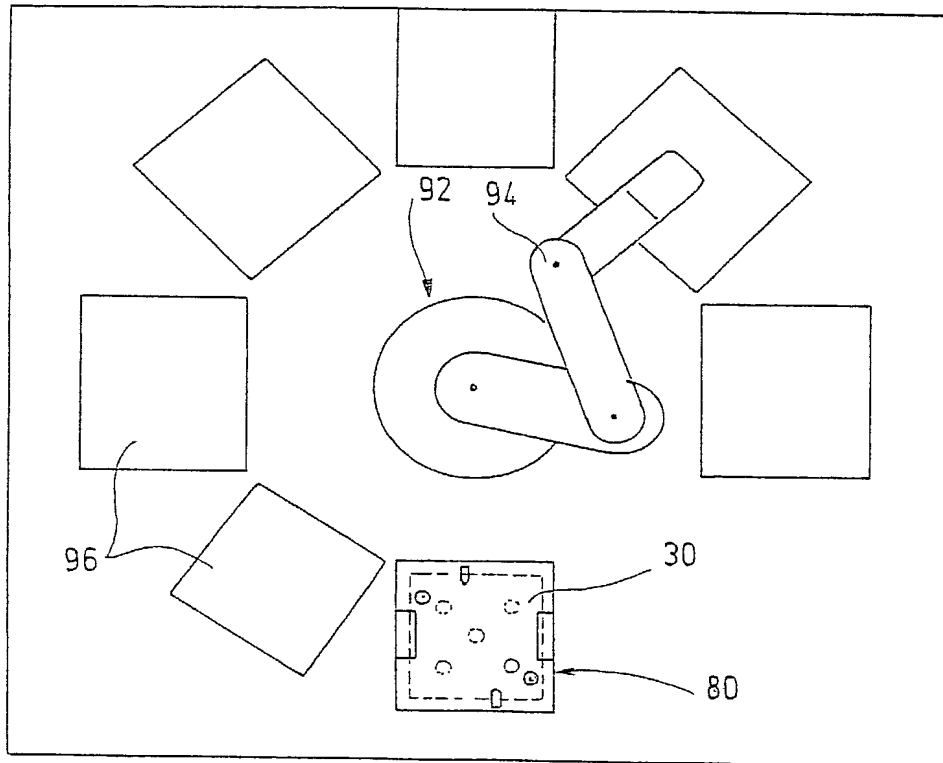


Fig.9

[10191/2222]

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **SUBSTRATE AND WORKPIECE CARRIER FOR HOLDING THE SUBSTRATE**, the specification of which was filed as PCT International Application No. **PCT/DE00/02368** on July 19, 2000;

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

Number	Country filed	Day/month/year	Priority Claimed Under 35 USC 119
199 34 114.1	Fed. Rep. of Germany	21 July 1999	Yes

And I hereby appoint Richard L. Mayer (Reg. No. 22,490) and Gerard A. Messina (Reg. No. 35,952) my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. (2)

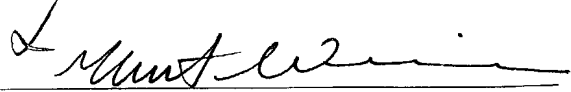
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful and false statements may jeopardize the validity of the application or any patent issued thereon.

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